

Respons Fisiologis dan Ketahanan Padi (*Oryza sativa* L. 'Cempo Merah') Terhadap Penyinaran Ultraviolet B (UVB) dengan Pemberian Pupuk Silikat

Abstrak

Radiasi UV-B (280-320 nm) dapat menimbulkan perubahan komposisi kimia tanaman sehingga menyebabkan *photooxydative stress*. Silika merupakan unsur non esensial yang mampu meningkatkan resistensi tanaman terhadap cekaman biotik dan abiotik. Aplikasi silika pada tanaman dapat meningkatkan resistensi tanaman dari pengaruh UV-B. Silika pada padi dapat berperan sebagai *UV Screening* yang dapat menurunkan transmisi radiasi UV di bagian epidermis (Schaller *et al.*, 2013). Penelitian ini bertujuan untuk mengetahui respons fisiologis pertumbuhan dan ketahanan padi 'Cempo Merah' terhadap penyinaran UV-B pada pemberian pupuk silikat. Percobaan ini menggunakan pupuk silikat sumber kalsium silikat (CaSiO_3) dengan Rancangan Acak Lengkap (RAL) 2 faktor, yaitu jumlah silikat dan penyinaran UV-B. Perlakuan silikat yang diberikan terdiri dari 3 level yaitu 0 mg/kg, 75 mg/kg, 150mg/kg. Perlakuan penyinaran UV B dilakukan dengan 3 perlakuan yaitu tanpa penyinaran UV B, UV B 8 watt ($5,79\text{kJ/m}^2$) dan 15watt($11,35\text{kJ/m}^2$). Parameter yang diamati meliputi tinggi dan jumlah daun dan jumlah anakan, pengukuran kadar klorofil, volume akar, biomassa akar dan tajuk, pengukuran aktivitas enzim antioksidan *Super Oxide Dismutase* (SOD), analisis total fenol serta pengukuran tebal epidermis daun dan penghitungan kerapatan stomata. Data yang diperoleh selanjutnya dianalisis menggunakan *Analysis of Variance* (ANOVA). Jika terdapat beda nyata antar perlakuan, dilanjutkan dengan analisis menggunakan *Duncan's Multiple Range Test* (DMRT) dengan taraf kepercayaan 95%. Hasil menunjukkan bahwa penyinaran UV B menghambat pertumbuhan tinggi tanaman, jumlah daun, kadar klorofil, biomassa akar dan tajuk, volume akar serta menurunkan densitas stomata dan ketebalan epidermis. Penyinaran UV B meningkatkan kadar SOD dan total fenol. Pemberian pupuk silikat meningkatkan pertumbuhan dan mampu meningkatkan ketahanan tanaman pada penyinaran UV B yang ditunjukkan dengan penurunan kadar enzim SOD dan total fenol. Pemberian pupuk silikat 75 mg/kg efektif dalam meningkatkan pertumbuhan dan ketahanan padi 'Cempo Merah' yang diberi perlakuan penyinaran UV B.

Kata Kunci: Silikat, UV B, Pertumbuhan, Ketahanan, Padi Merah

Physiological Response and Resistance of Red Rice (*Oryza sativa* L. 'Cempo Merah') Under UV-B Irradiation with Silicate Fertilizer Application

Abstract

UV-B radiation (280-320 nm) may cause changes in the chemical composition of plants causing photooxidative stress. Silica application in plants can increase plant resistance from UV-B effect by increasing the antioxidant component either enzymatically or non-enzymatically and also act as 'UV Screening' which can decrease UV radiation transmission in the epidermal area. This study aims to determine the physiological response of growth and resistance of 'Cempo Merah' rice to UV-B irradiation with the application of silicate fertilizer. This experiment used silicate fertilizer source of calcium silicate (CaSiO_3) with Completely Randomized Design (CRD) 2 factors, which is amount of silicate and UV-B irradiation. The treated of Silicate consisted of 3 levels ie 0 mg / kg, 75 mg / kg, 150 mg / kg. The UV B irradiation treatment was performed with 3 treatments ie without UV B irradiation, UV B 8 watts ($5.79\text{kJ} / \text{m}^2$) and 15watt ($11.35\text{kJ} / \text{m}^2$). The observed parameters included measurement of height and number of leaf and number of tillers, measurement of chlorophyll content, root volume, root biomass and canopy, measurement of Super Oxide Dismutase (SOD) antioxidant enzyme activity, total phenol analysis and observation of leaf epidermis thickness and stomatal density. The data obtained are then analyzed using Analysis of Variance (ANOVA). If there is a significant difference between treatments, proceed with an analysis using Duncan's Multiple Range Test (DMRT) with a 95% confidence level. The results showed that UV B irradiation inhibited the growth of plant height, leaf count, chlorophyll content, root biomass and canopy, root volume and decreased stomatal density and epidermal thickness. UV B irradiation increased levels of SOD and total phenol. The addition of silicate fertilizer enhanced the growth and enhanced the resistance of plants to UV B irradiation which is indicated by the low level of SOD enzyme and total phenol. 75 mg / kg of silicic fertilizer is effective in increasing the growth and resistance of rice 'Cempo Merah' treated with UV irradiation.

Keywords: Silicate, UV B, Growth, Resistance, Red Rice